MASTER OF SCIENCE
IN
INFORMATION TECHNOLOGY
MANAGEMENT

GROUP COLLABORATION IN ORGANIZATIONS: ARCHITECTURES,
METHODOLOGIES, AND TOOLS
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In a world that is increasingly more connected using networks of all types, collaboration becomes a way to leverage these connections to benefit both individuals and organizations. Currently there are numerous technologies, to support different types of collaboration. In order to make informed decisions, it is necessary to be familiar with these technologies and adopt a formal methodology to capture the organization's collaborative requirements. However, no methodology currently exists to help an organization determine which technologies and tools would enable and support its specific collaborative requirements.

    This thesis analyzes collaboration as an organizational phenomenon and a network application, presents ideal collaborative environment characteristics, surveys existing collaborative environments and tools, and proposes a methodology for selecting and building a collaborative environment. This methodology is based on a synthesis of the traditional System Development Life Cycle methodologies used to analyze, design, and implement information systems.

KEYWORDS: Collaboration, Groupware, CSCW, Knowledge Management, Collaborative Environment, Development Methodologies

SATELLITE COMMUNICATIONS FOR COAST GUARD HOMELAND DEFENSE
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The Coast Guard has developed a C4ISR infrastructure ashore to aid personnel in decision making, job performance, and information exchange, but in doing so they have neglected their most important asset; the afloat community. In an effort to explore and find a wireless connectivity solution for CG cutters, the authors examined the requirements for solutions in the area of commercial satellite connectivity. This connection is necessary for USCG afloat assets to access vital maritime, law enforcement, and fisheries databases maintained ashore, as well as to keep those ashore informed of mission status. This connection

also allows cutters to connect to CGDN+ and the Internet, improving both morale and personnel administration issues (leave, medical records, training, assignment process, etc.) With the technologies now available, the USCG must identify which solutions can best be utilized with respect to bandwidth, security, cost, equipment installation requirements, durability, and range. Primarily the research dissects Qualcomm's Globalstar satellite options, INMARSAT and capacity expander (ICE) technology, and current Navy INMARSAT technology solutions. The authors have identified technological limitations and proper requirement analysis techniques that will aid in future Coast Guard evaluations of these extremely high cost wireless networks. Finally, the authors make recommendations for near and long-term solutions to the Coast Guard's connectivity requirements.

KEYWORDS: Satellite Communications, Coast Guard, Cutter Connectivity, INMARSAT, ADNS, Globalstar, SATCOM, Homeland Defense

DESIGN AND IMPLEMENTATION OF A HYBRID THREE-TIER AND TWO-TIER
CLIENT/SERVER EDUCATION MANAGEMENT SYSTEM
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The Naval Postgraduate School (NPS) has used the same Education Management System (EMS) for the past twenty-five years. The system is supported by a hierarchical database called FOCUS and provides an antiquated DOS-based user interface for a limited number of stakeholders in the education management process. The current system is beyond its usefulness as NPS moves into the 21st century for three primary reasons. First, the FOCUS database is not interoperable with modern commercial software products that are used campus-wide which has led to the existence of numerous disparate databases throughout the campus. This, of course, has led to redundant data throughout NPS that is not synchronized to reflect the most current information. Second, the system is not extensible to leverage modern web-based technologies or meet IT-21 software and hardware requirements. This inhibits NPS from developing modern applications that could improve administrative processes campus-wide. Additionally, the current infrastructure will not be interoperable with projects currently under development in the Department of the Navy. Lastly, the current system architecture is not cost-effective for NPS. The FOCUS database is maintained on a mainframe computer. The cost of maintaining the mainframe for the sole purpose of storing education management data is not justifiable.

The thesis team has designed and implemented a hybrid Three-Tier and Two-Tier Client/Server Education Management System for use at the Naval Postgraduate School, known as PYTHON. The system was developed using current industry standards and Department of Defense compliant hardware and software. An intuitive, user-friendly graphical user interface (GUI) was designed for the end-users to interface with a client computer. A significant portion of the solution was a comprehensive relational database that captures all the business entities of the Naval Postgraduate School. The resulting system was cost-effective and eliminated the need for the currently maintained FOCUS database.

ROLE-BASED ACCESS CONTROL FOR LOOSELY COUPLED DISTRIBUTED DATABASE MANAGEMENT SYSTEMS

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Much of the work to date to apply Role-Based Access Control (RBAC) to database management systems has focused on single database systems or an integrated distributed database system. For situations where the need exists to consolidate multiple independent databases, and where the direct integration of the databases is neither practical nor desirable, the application of RBAC requires that policy be enforced via a method that is distinct from the databases. The method must provide for the verification of the RBAC policy, while allowing for the independence of the various databases on which the policy is enforced. This paper proposes a model for an application that provides for a web-based interface for users to be granted access to data held in various independent databases. The application enforces a strict RBAC policy on a well-defined set of accesses, while alleviating the need for users to have a separate account on each of the databases.

AN ENTERPRISE INFORMATION PORTAL FOR CROSS-UNIT COLLABORATION IN THE BOTSWANA DEFENCE FORCE

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This thesis discusses the need for an information technology system to facilitate cross-unit collaboration in the Botswana Defence Force (BDF). The existing traditional means of communication and information sharing among the BDF units and bases do not meet the present requirements and may negatively impact productivity and mission readiness in the BDF. The thesis begins with a background discussion of the communication problems in the BDF and examines the problem in the context of designing and implementing an Enterprise Information Portal (EIP). This would facilitate the collaboration and the flow of information within and among units and throughout different regions in Botswana. The approach to the problem involves defining an EIP, evaluating the benefits of an EIP and assessing technologies critical to the implementing an EIP. After defining an EIP, a business plan is presented to provide a guideline for implementing the Botswana Defence Force Enterprise Information Portal (BDF-EIP). The thesis further discusses organizational challenges that may affect implementing the BDF-EIP. These organizational issues include a discussion on change, change management and champion.

MODEL DESIGN FOR A BATTLEGROUP INTRANET USING AN UAV

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In this thesis the groundwork for an unmanned aerial vehicle (UAV) supporting the communications architecture of a U.S. Naval Battle Group is proposed. The Global Hawk UAV described in detail is used as an example of a viable system. A system using an UAV as a central node in a battle group intranet could enhance the communications within a battle group. The preliminary steps required to demonstrate this concept using a model based on the OPNET software program are defined. The model presented is the one recommended for modifying to research this concept further. Finally, the requirements for transitioning the existing model to one that can test the operational concept proposed in this thesis are given

KEYWORDS: Modeling & Simulation Technology, Information Display and Performance Enhancement, Information Systems, Information Technology, Surface Ship Combatants

WEB-BASED COLLABORATION TECHNOLOGY AND REQUIREMENTS FOR PEACE OPERATIONS

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To date, no interoperable information regime exists that can link all players who participate in providing aid during a Complex Humanitarian Emergency. In this thesis, Web-based collaboration architectures are presented with standard protocols and common architectures and templates which may initially serve as a collaboration platform, and add XML technologies to personalize and render information and processes more meaningful to stakeholders. The synergy of technologies provides a basis for the "Ideal" collaborative environment of asynchronous and synchronous collaboration capabilities for a Web-based Information Architecture for Peace Operations.

KEYWORDS: Collaboration Software Architecture, XML Technology, WebDAV

WEB-BASED DATABASE APPLICATIONS: AN EDUCATIONAL, ADMINISTRATIVE MANAGEMENT SYSTEM FOR MILITARY ACADEMIES

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Not only does a military academy have all the information overload of a normal university but it also has the extra burden of the military environment. Without a reliable information system, administrative and educational functions cannot be performed.

This thesis deals with the problem of administrative overload in managing student, faculty, regiment personnel and course data in a military academy. It proposes an Educational Administrative Management System (EAMS), a Web-based data management system, as a solution. With this goal in mind, existing client-server architectures, server side application development tools and database technologies are explored, and the best configuration of these tools is selected. Some of them are recommended.

As a result of the study, Java Servlets and Java Server Pages are found as the optimal server-side programming tool for the application. A working prototype of the system is provided based on Oracle 8i DBMS, Apache Tomcat Web server, Java Servlets and Java Server Pages.

Suggestions are provided for coping with change management issues during the implementation of the system.

KEYWORDS: Internet, Web Based Architecture, Java, Java Servlets, Java Server Pages (JSPs), Structured Query Language (SQL), Java Database Connectivity (JDBC), Database and Military Academy